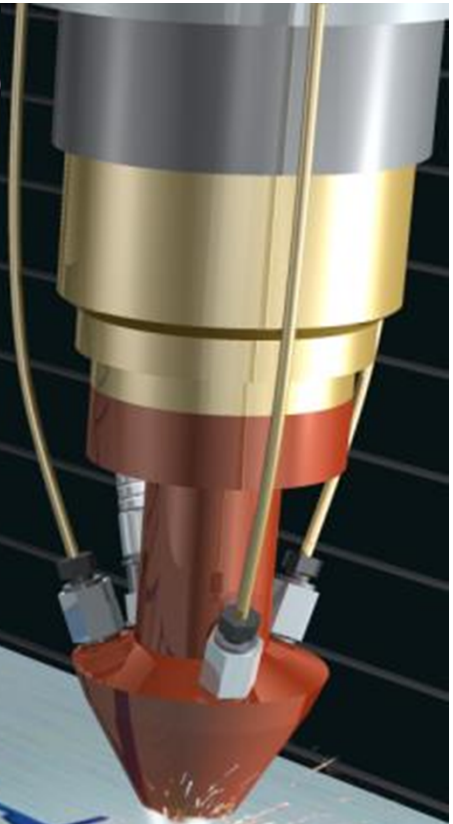
# BLUEPRINT FOR ACTION

DOD Proposers' Days – July 9th & 10th 2013



# *The National Network for Manufacturing Innovation*

## *Building the Partnership Picture*

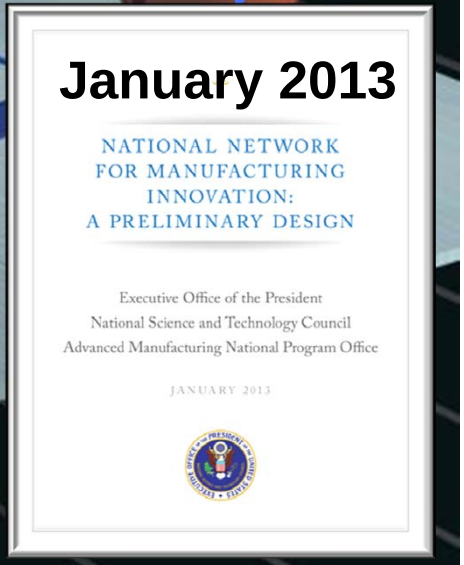

**Mike Molnar**
**Advanced Manufacturing**
**National Program Office**
**www.manufacturing.gov**

# US Manufacturing Policy Milestones





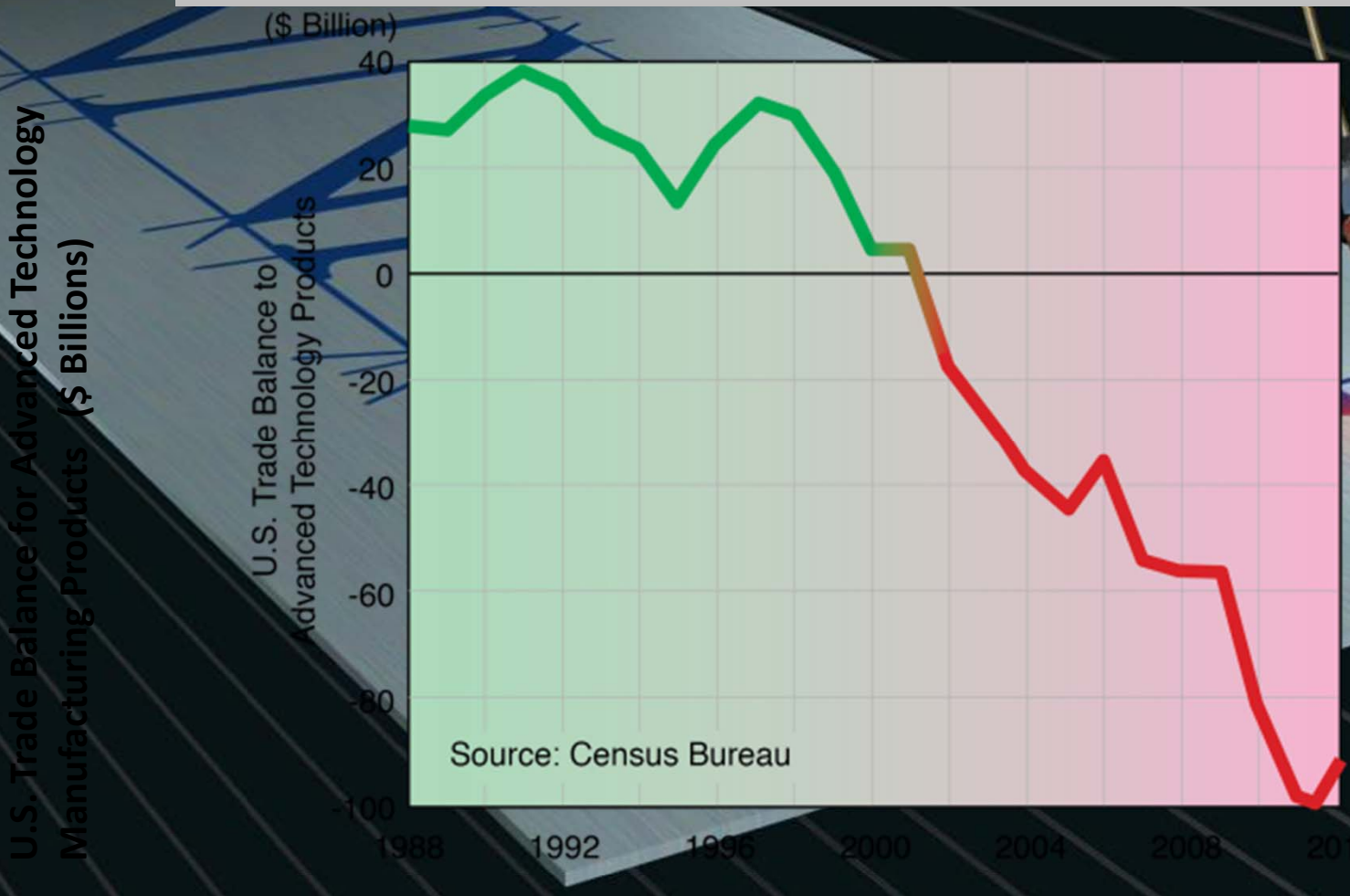




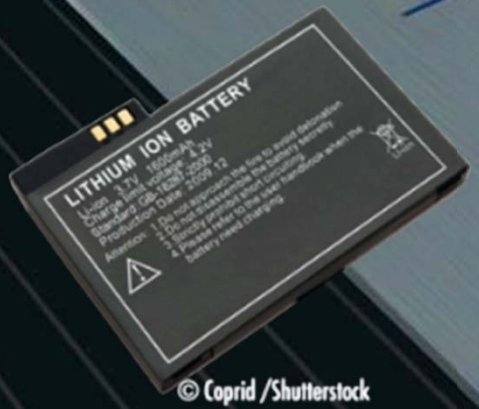
# U.S. Trade Balance of Advanced Technology

## *Swung to historic deficit, lost 1/3rd of workforce*

- **11%** of U.S. GDP, **12** million U.S. jobs
- ~ half of U.S. Exports
- Nearly 20% of the world's manufactured value added



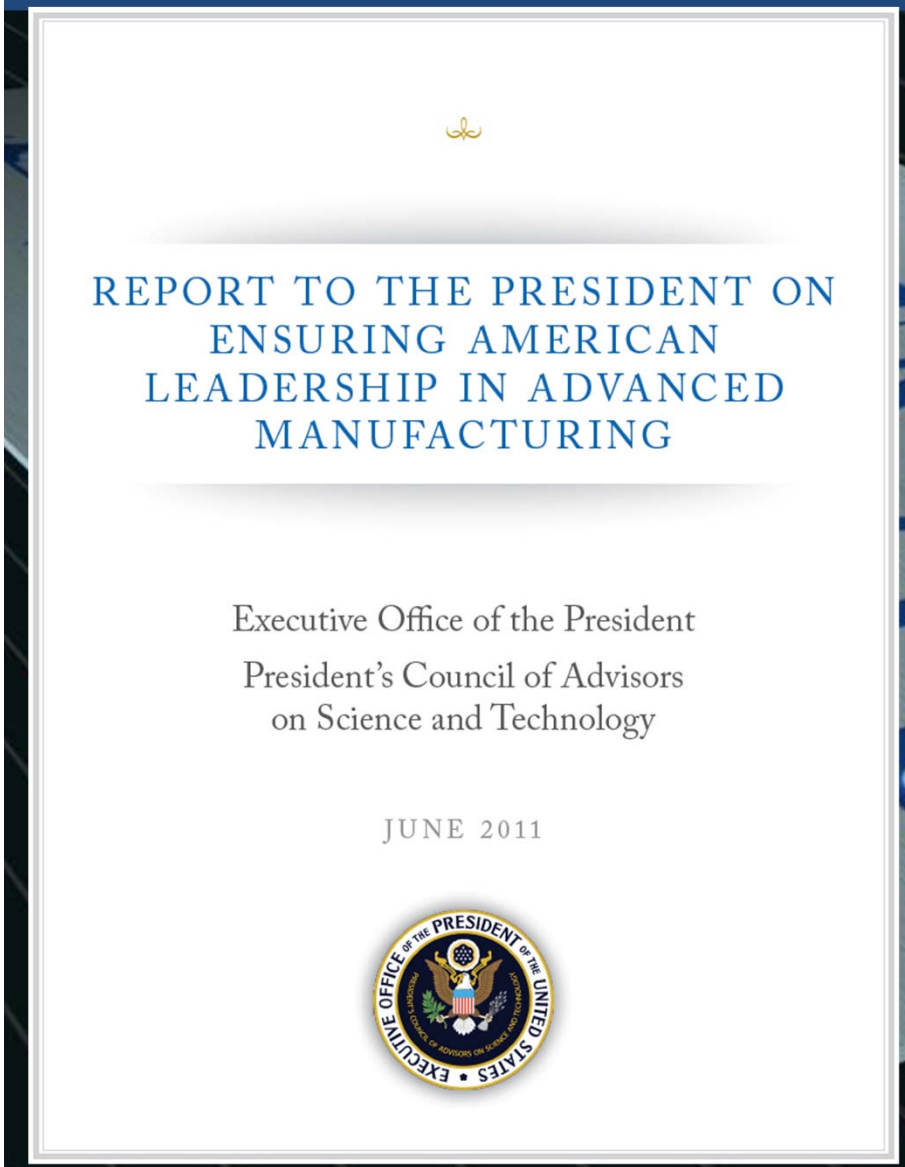
# Products invented here, now made elsewhere - not driven by labor cost



# 2011 PCAST Manufacturing Report to the President

## *Making the case for a Manufacturing Initiative*




U.S. should strive to revitalize advanced manufacturing because:

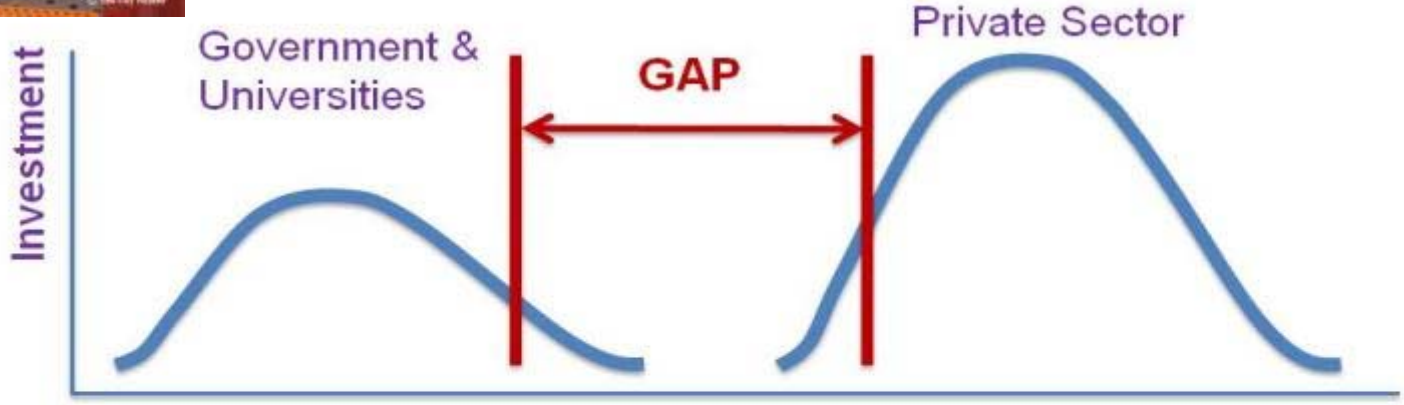
- **Jobs**: Manufacturing provides high-quality, good-paying jobs for American workers.
- **Innovation**: By keeping manufacturing local, design, engineering, scale-up, and production processes feed back on the conception and innovation sectors to generate new ideas and novel second- and third-generation products.
- **Security**: Domestic manufacturing capabilities using advanced technologies and techniques are vital to maintaining national security and critical resources.

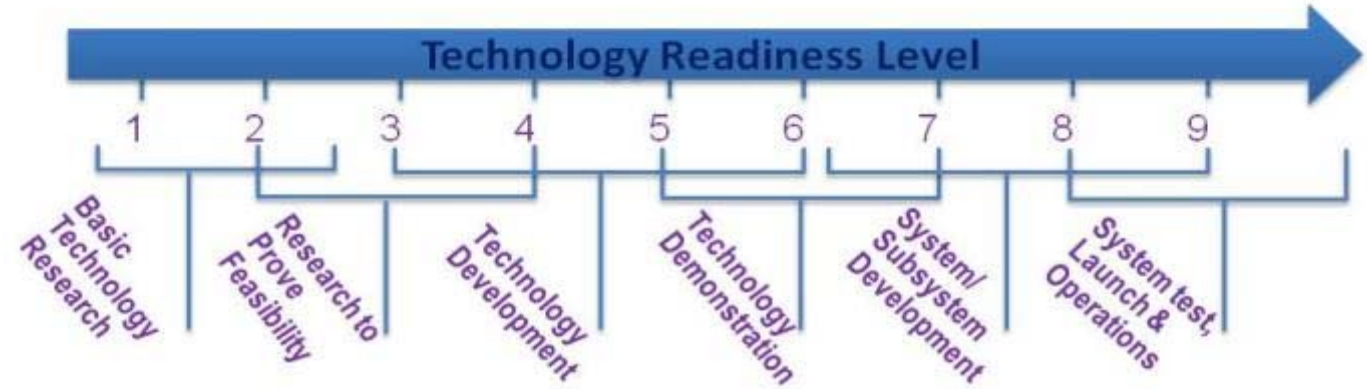
NEED: Coordinated Federal Focus on a National Manufacturing Initiative

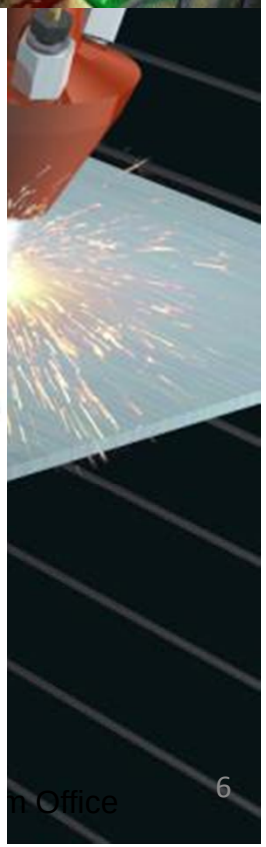
# The Scale-up Gap or Missing Middle

*Common terms*
*The "valley of death"*
*The "missing Bell Labs"*
*The "industrial commons"*

## Gap in Manufacturing Innovation



# Partnership for a US Manufacturing Renaissance

*"Today, I'm calling for all of us to come together- private sector industry, universities, and the government- to spark a renaissance in American manufacturing and help our manufacturers develop the cutting-edge tools they need to compete with anyone in the world…*

*With these key investments, we can ensure that the United States remains a nation that 'invents it here and manufactures it here' and creates high-quality, good paying jobs for American workers."*

**President Obama,**

**on establishing Advanced Manufacturing Partnership**

**June 24, 2011.**

# AMP Industry and Academia Leadership

## 12 Industry CEOs, 6 University Presidents

**Robert Birgeneau**

Berkeley
UNIVERSITY OF CALIFORNIA

**Wesley Bush**

NORTHROP GRUMMAN

**Louis Chenevert**

United Technologies

**Jared Cohon**

Carnegie Mellon University

**Mary Sue Coleman**

MICHIGAN

**David Cote**

Honeywell

**Richard Harshman**

ATI Allvac
Allegheny Technologies

**Curt Hartman**

stryker

**John Hennessy**

STANFORD UNIVERSITY

**Susan Hockfield**

MIT

**Andrew Liveris**

DOW

**Bob McDonald**

P&G

**Alan Mulally**

Ford

**Douglas Oberhelman**

CATERPILLAR

**Paul Otellini**

intel

**G.P. "Bud" Peterson**

GEORGIA TECH

**William Weldon**

Johnson & Johnson

**Wendell Weeks**

CORNING

## Many specific actions, emphasis on ***HOW***….

# Partnership

*Industry – Academia – Government*

Working better, together to create transformational technologies and build new products and industries

**And when… NOW**

**We can't wait to restore US Manufacturing Leadership**

# 2012 AMP Report to the President

## 16 recommended actions in three pillars:

### I. Enabling Innovation

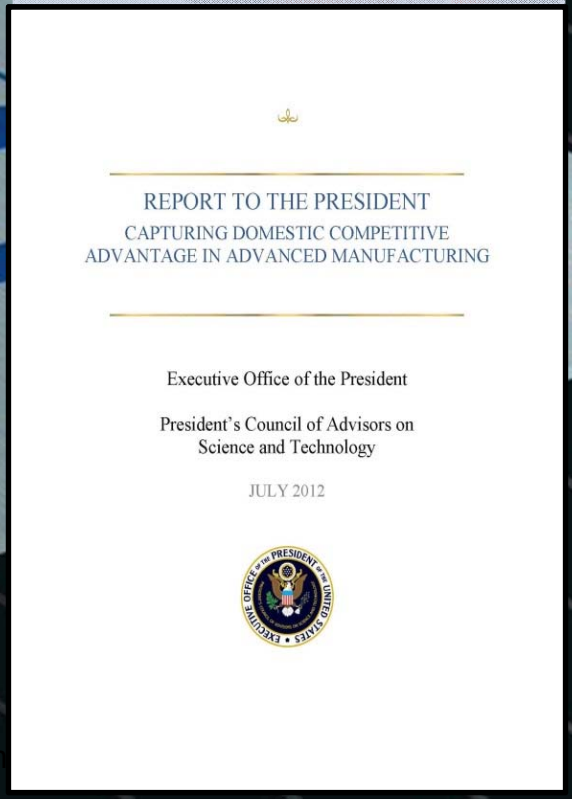
- **Establish a National Network of Manufacturing Innovation Institutes (NNMI)**
- Establish a national advanced manufacturing portal
- Establish a national advanced manufacturing strategy
- Increase R&D funding in top cross-cutting technologies
- Empower enhanced Industry /University collaboration in advanced manufacturing research
- Foster a more robust environment for Commercialization of Advanced Manufacturing Technologies

### II. Securing the Talent Pipeline

- Improve public perceptions about manufacturing
- Tap the talent pool of returning veterans
- Invest in community college level education
- Partner to provide skills certifications and accreditation
- Enhance advanced manufacturing university programs
- National manufacturing fellowships and internships

### III. Improving the Business Climate

- Enact tax reform
- Streamline regulatory policy
- Improve trade policy
- Update energy policy



REPORT TO THE PRESIDENT

CAPTURING DOMESTIC COMPETITIVE ADVANTAGE IN ADVANCED MANUFACTURING

Executive Office of the President

President's Council of Advisors on Science and Technology

JULY 2012

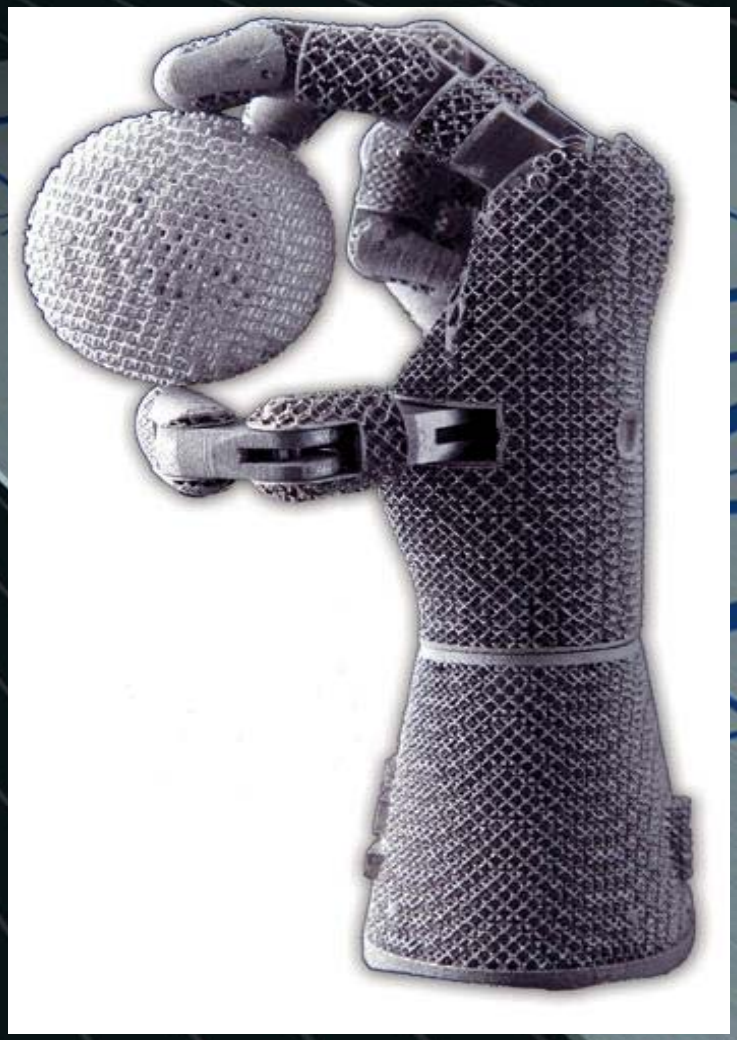
# National Network for Manufacturing Innovation

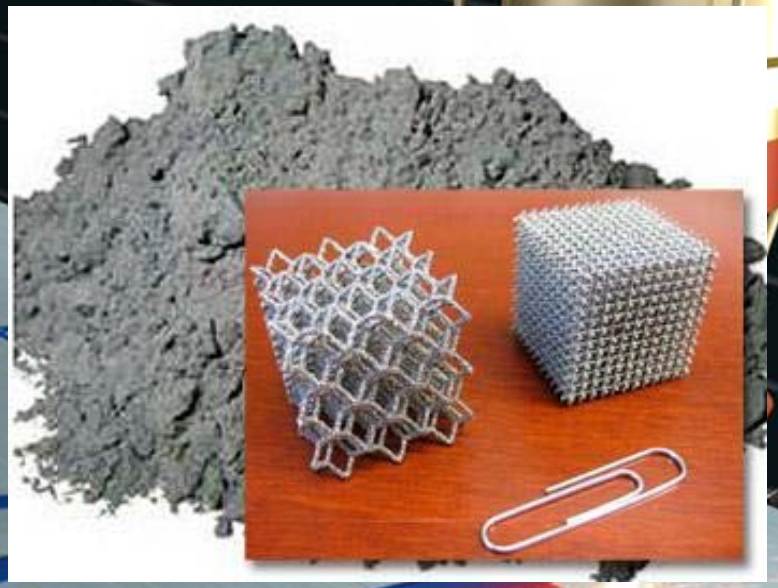

*"Sparking this network of innovation across the country, it will create jobs and will keep America leading in manufacturing…"*

*President Obama, March 9, 2012*

- The President's Budget proposes a $1 billion investment to create this new National Network for Manufacturing Innovation, creating up to 15 manufacturing institutes for Industry
- We Can't Wait:  2012 Pilot Institute – on Additive Manufacturing

# 2012 – DOD-led Pilot Manufacturing Institute on *Additive Manufacturing*





April 13 SN

May 8 BAA

May 16 Industry Day

August 16 Award

# National Additive Manufacturing Innovation Institute (NAMII), Youngstown OH

**Prime Awardee: National Center for Defense Manufacturing and Machining**

- Providing $40M cost share, ~ $20M from industry
- $48M available for research projects
- Strong leveraging of equipment, existing resources
- Strong business development
- Ties to many organic facilities
- Tiered membership-based model, low cost to small business and nonprofits


# NAMII Initial Partners

## Industry

### AM Materials
Allegheny Technologies
FMW Composite Systems
Lubrizol
Oxford Performance Materials
Plextronix
RTI
Touchstone

### AM Equipment
ExOne
Laser Technology Associates
MicroFab Technologies
nScrypt
Optomec
POM
Sciaky
Stratasys

### AM Manufacturing
AlphaMicron
FMW Composite Systems
Kent Displays
Morris Technologies
Paramount Industries

### Platform Systems
Boeing
GE Transportation
General Dynamics
Goodyear
Honeywell
Johnson Controls
Kennametal
Lockheed-Martin
Northrop Grumman
OSRAM Sylvania
Parker Hannifin
Timken
Westinghouse Nuclear

### Inspection
M-7 Technologies
Stratonics

### Software
AST2
Autodesk
IBM

## Manufacturing Support

### Manufacturing Extension Partners
PA MEP Network (IRCs)
OH MEP Network

### Industry Organizations/TBEDs
BFTP
EIO
JumpStart
OAI
Nortech
Wohlers Associates

## Workforce Training

### North Eastern Ohio
Eastern Gateway CC
Lorain CCC
Youngstown State Univ.

### Western Pennsylvania
CC of Allegheny C
Robert Morris Univ.
Westmoreland CCC

### Eastern Pennsylvania
Northampton CC
Penn College of Technology
Penn State University

### West Virginia
RCBI @ Marshall Univ.

## NAMII Hub
Northeast Ohio Facility

## National Center for Defense Manufacturing and Machining

## Research Universities*

**Carnegie Mellon University** (Automation)

**Case Western Reserve University** (Micro/Nano)

**Kent State University** (Sensors)

**Lehigh University** (Composites)

**Penn State University, ARL** (Metal SLS, E-beam)

**University of Akron** (Polymer/Ceramic LOM)

**University of Pittsburgh** (Medical)

## Government

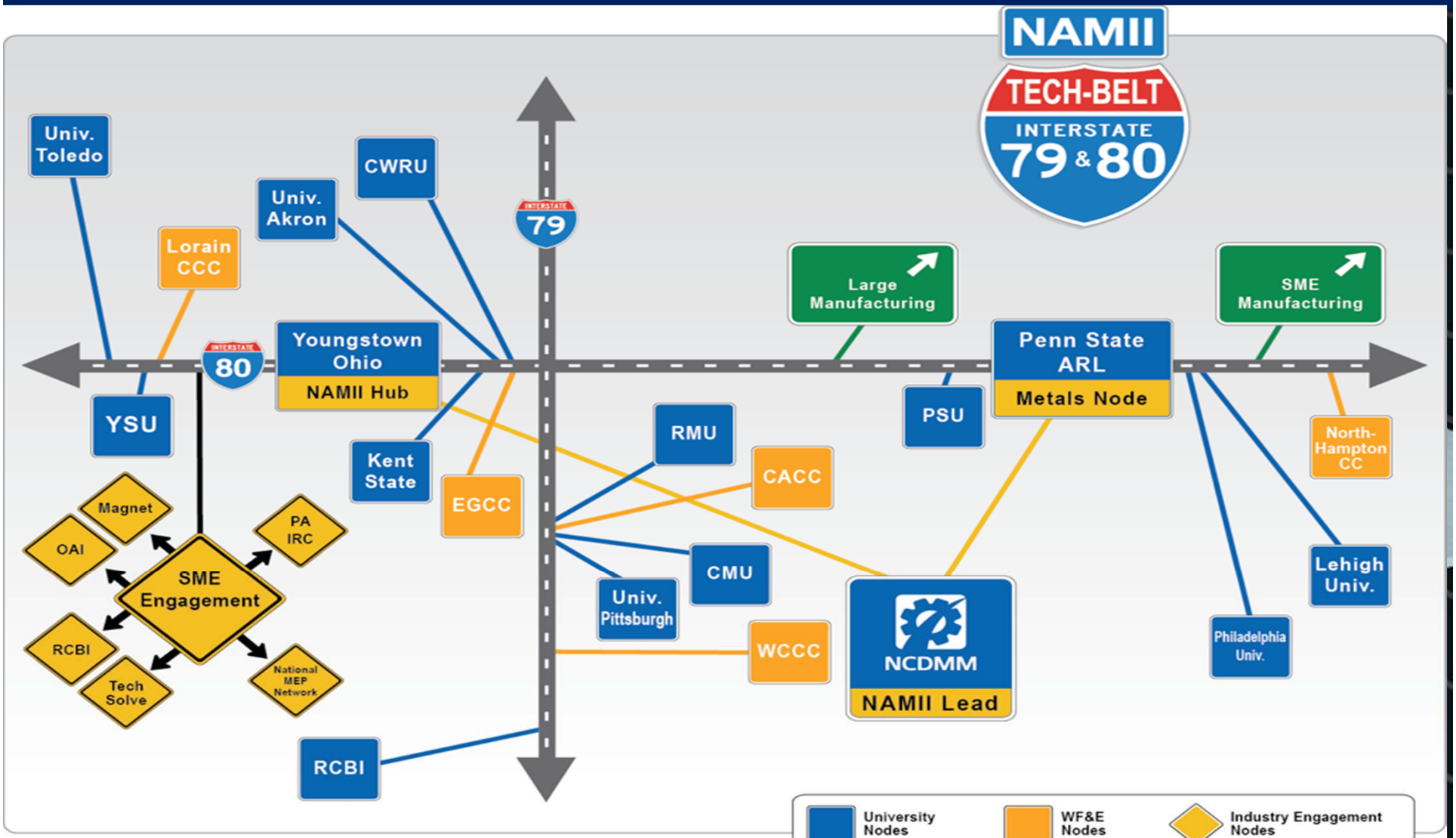
**Army ARDEC**
**ECDC**
**ManTech**
**NETL**
**NUWC**

## Manufacturing & Standards Organizations

**AMT**
**MTConnect Institute**
**NDMEC**
**NIST**
**SME**

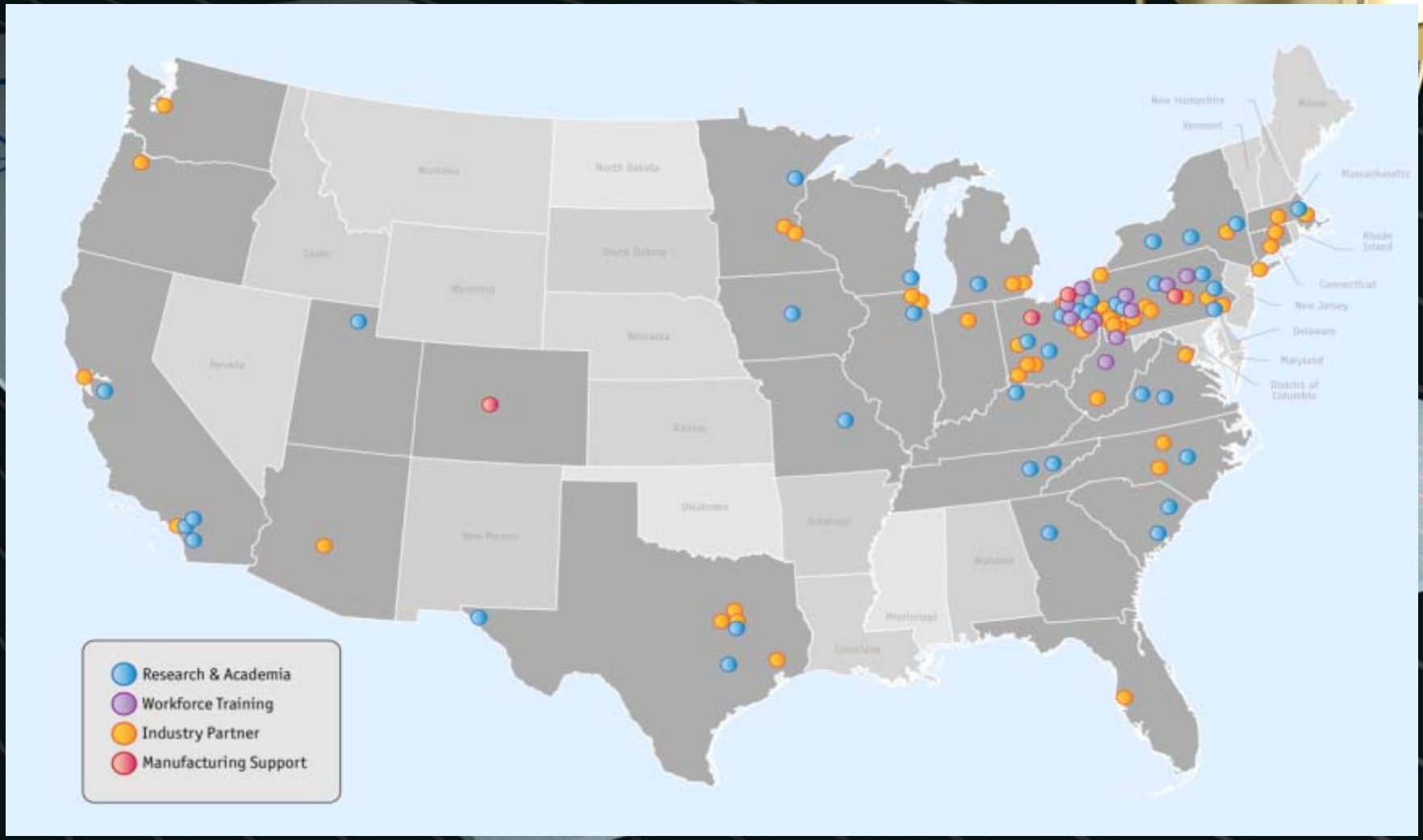
*Proposed thrust lead area in parentheses

# A REGIONAL Center of Excellence, with a vision for NATIONAL PRESENCE

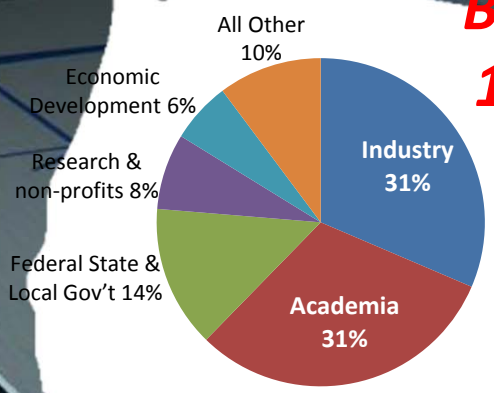


# Projected 2014 NAMII Consortia

*based on *2012 Wohlers Report* of active AM organizations and NAMII discussions to date



# Public Engagement on Design
## *Workshops & Request for Information*




***Broad & Diverse Stakeholder Input***

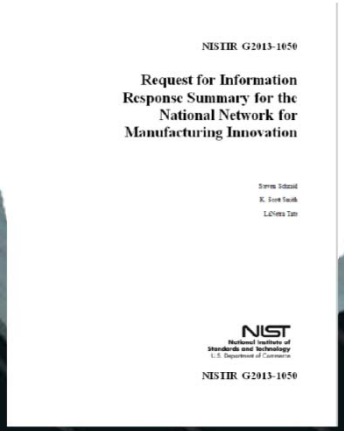
***1,200 voices on the NNMI Design!***


**University of Colorado**
**Boulder, Colorado**

**Cuyahoga Community College**
**Cleveland Ohio**

**Rensselaer Polytechnic Institute**
**Troy New York**

**National Academies Beckman Center**
**Irvine California**


NISTIR G2013-1050

Request for Information Response Summary for the National Network for Manufacturing Innovation

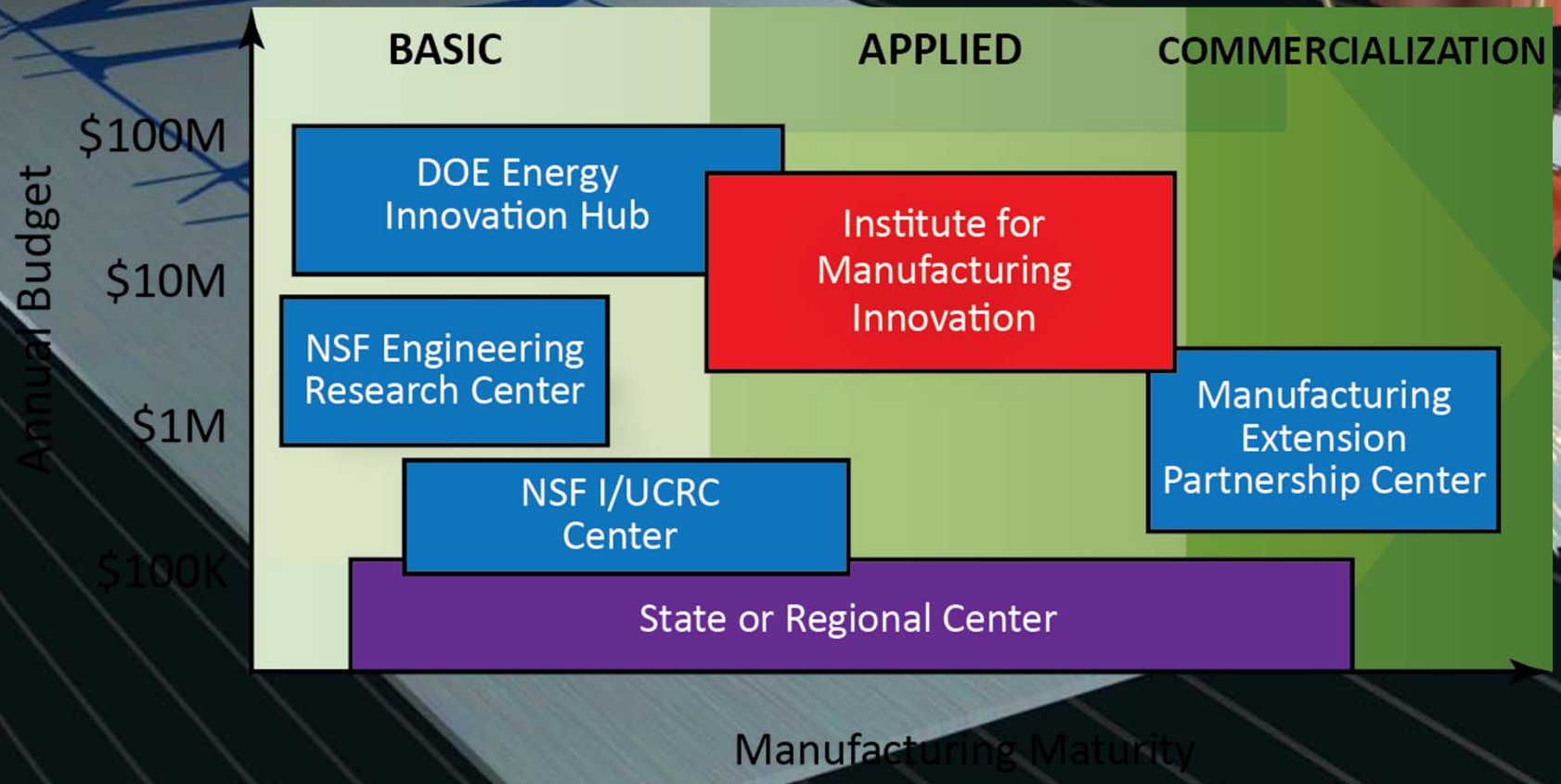
NISTIR G2013-1050

**U.S. Space and Rocket Center**
**Huntsville, Alabama**

# Focus on Scale Up – The Missing Middle

Basic science
Largely government funded

Commercialization
private sector owned/funded



# Institute Activities

Credit: anyaivanova /Shutterstock

**Applied Research & Demo projects for**

- reducing cost/risk on commercializing new tech.
- Solving pre-competitive industrial problems

Credit: Dmitry Kalinovsky /Shutterstock

**Tech Integration -** Development of innovative methodologies and practices for supply chain integration

Credit: withGod/Shutterstock

**Small/Medium Enterprises**

- Engagement with small and medium-sized manufacturing enterprises (SMEs).

**Institute**

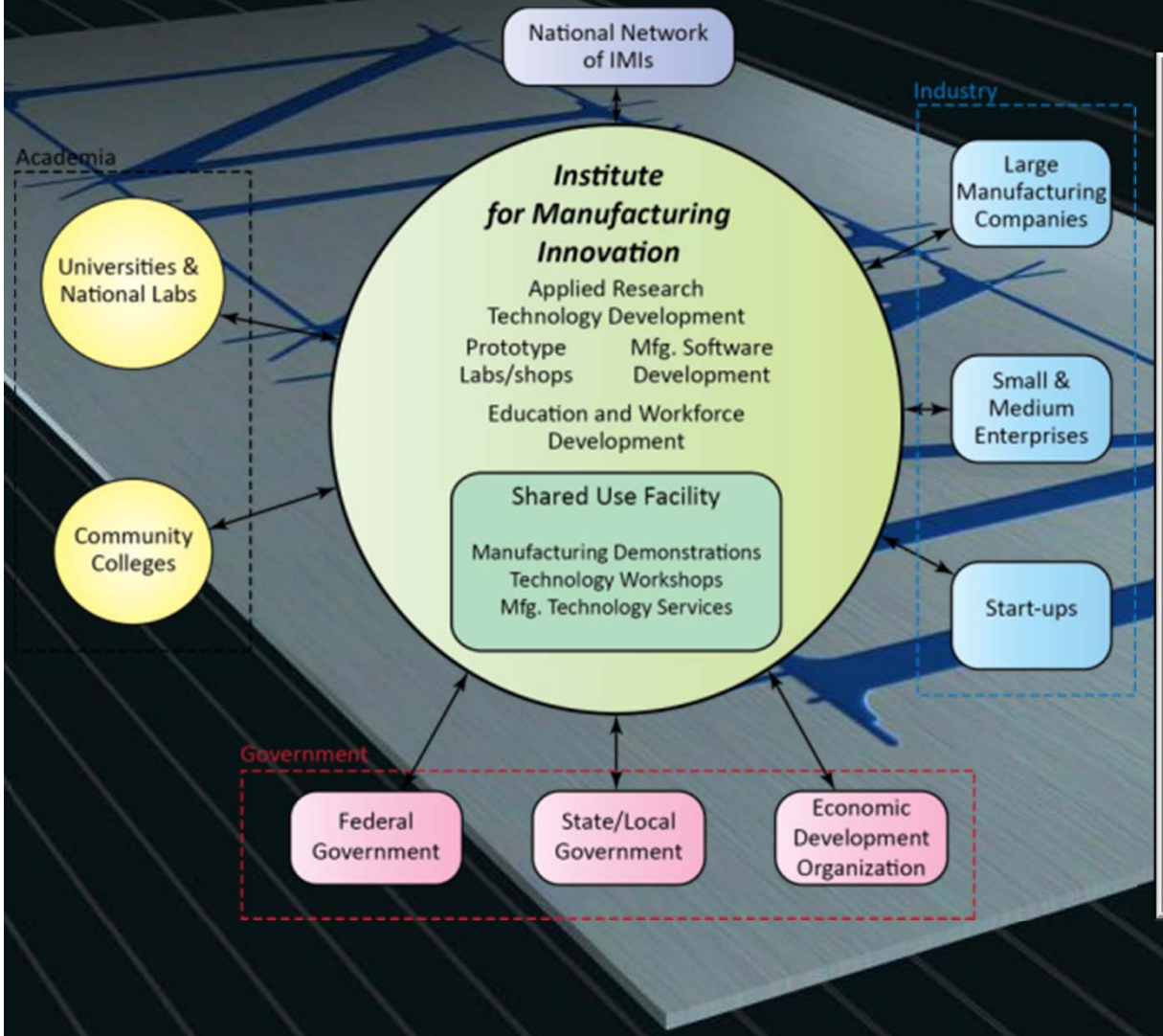

Source: istockphoto

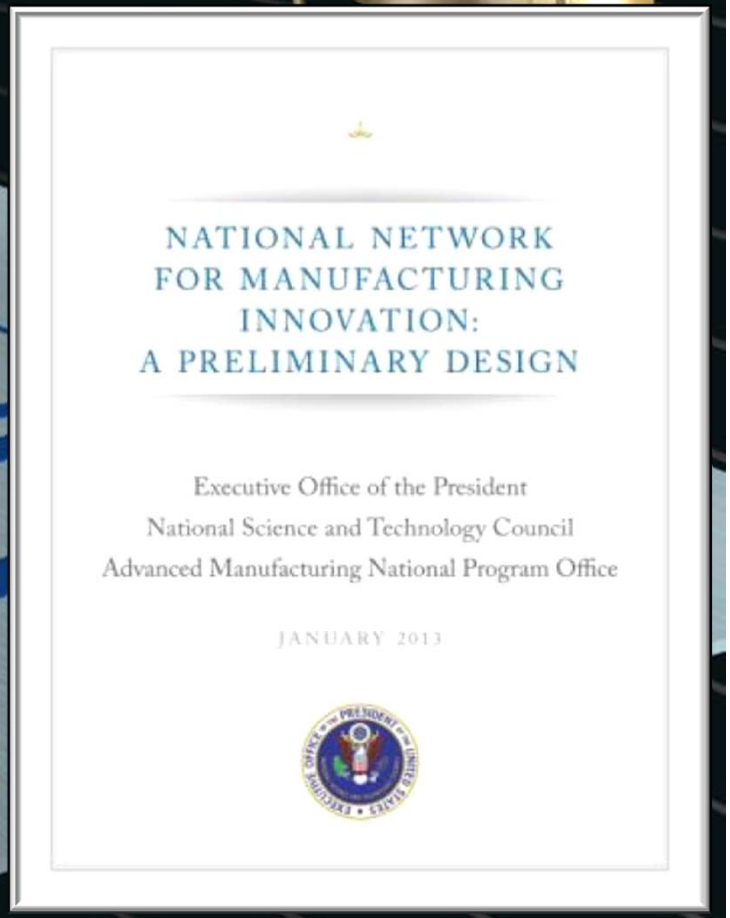
Credit: Lisa Young/Shutterstock

**Education, technical skills and Workforce development**

Education and training at all levels for workforce development

# Institute Design



# State of the Union Announcement

***Our first priority is making America a magnet for new jobs and manufacturing.*** *Last year, we created our first manufacturing innovation institute in Youngstown, Ohio. A once-shuttered warehouse is now a state-of-the art lab where new workers are mastering the 3D printing that has the potential to revolutionize the way we make almost everything. There's no reason this can't happen in other towns.*

*So tonight, I'm announcing the launch of three more of these m[illegible]uf[illegible]turi[illegible]g hubs, where businesses w[illegible] D[illegible]epartments of Defens[illegible] ns left behin[illegible] ters of hig[illegible]*

*And I'[illegible] ne[illegible] ntee that t[illegible] ng is Made in [illegible]*

- Three full scale institutes, to be awarded in 2013
- $200M federal investment over five years

State of the Union Address, February 13, 2013

# Next Generation Power Electronics Manufacturing

**Wide bandgap (WBG) semiconductors**

- operate at much higher temperatures, voltages, and frequencies compared to Si.
- allow for smaller, lighter, faster, and more reliable power electronic components.
- enable more efficient distribution and use of electric power.
- need cutting-edge manufacturing processes that can produce high-quality, affordable devices.

| Material | Chemical Symbol | Bandgap Energy (eV) |
|---|---|---|
| Germanium | Ge | 0.7 |
| Silicon | Si | 1.1 |
| Silicon Carbide | SiC | 3.3 |
| Gallium Nitride | GaN | 3.4 |

WBG

iStock/19221337, 18866928, 15649881

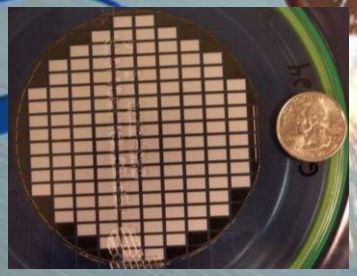


Image source: DOE Oak Ridge National Laboratory

*Poised to revolutionize the next generation of power electronics and clean energy innovations.*

Lead: Advanced Manufacturing Office, DOE
Letter of Intent: 7/11/13, Full Proposal: 8/29/13
http://manufacturing.gov/doe-led_institutes.html

# Lightweight and Modern Metals Manufacturing Innovation (LM3I) Institute

DOD

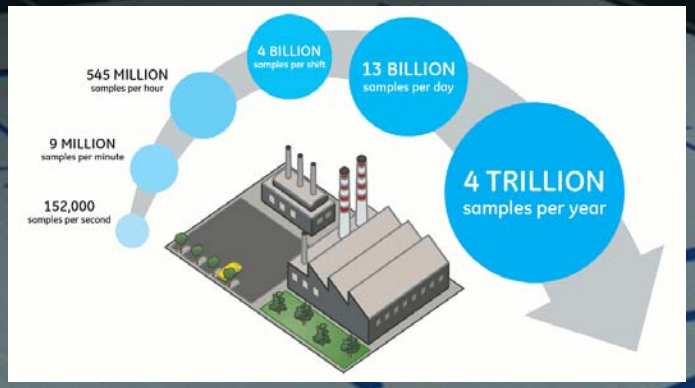
NASA

DOD

- New structural alloys face tremendous barriers to application due to lack of design guides and certifications as well as cost and scale-up challenges.
- The goal is to develop an advanced lightweight-metal supplier base for the U.S. to compete in the global market.
- Enable DOD to realize significant fuel reduction, increased payloads, and greater speed and agility of manned, unmanned, and soldier systems as well as benefits for commercial applications and energy savings.

Lead: Navy, Office of Naval Research
POC: Julie Christodoulou (Julie.christodoulou@navy.mil)
Proposers' Day: July 9, 2013
http://manufacturing.gov/dod-led_institutes.html

# Digital Manufacturing and Design Innovation (DMDI) Institute




Big Data Insight Group

Apriso

- The DMDI Institute will provide the proving ground to link promising information technologies, tools, standards, models, sensors, controls, practices and skills , and then transition these capabilities to the industrial base for full-scale application.
- For example, proving and progressing intelligent electro-mechanical design and manufacturing capabilities from laboratory to prototype factory environments would improve production efficiencies and costs.
- Focus is the smart and comprehensive use of the 'digital thread' throughout design, production and support.

Lead: Army, AMRDEC
POC: Greg Harris (gregory.a.harris81.CIV@mail.mil)
Proposers' Day: July 10, 2013
http://manufacturing.gov/dod-led_institutes.html

# Summary: Game Changing Characteristics

- Establish a presence, at scale, in the missing middle
- Partnering between all stakeholders
- An Industrial Commons, supporting future manufacturing hubs
- Emphasizing/supporting longer-term investments by industry
- Combining R&D with workforce training
- A national network of Institutes
- ***Overarching mission: Create new U.S. manufacturing capabilities and industries - to grow high paying manufacturing jobs of the future***

# *Thank you*

*For questions on the DOD BAA please contact the respective acquisition team*

*www.proposersday.org*

*Advanced Manufacturing National Program Office*

*www.manufacturing.gov*

Unless otherwise labeled, images are courtesy of The White House, the National Institute of Standards and Technology, and Shutterstock